BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
3 October 2002 (03.10.2002)

PCT

(10) International Publication Number
WO 02/076233 A1

(51) International Patent Classification[7]: A23G 9/28, B67D 5/02, 5/62, B65D 83/14

(21) International Application Number: PCT/EP02/03361

(22) International Filing Date: 22 March 2002 (22.03.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
01302743.8 26 March 2001 (26.03.2001) EP

(71) Applicant *(for AE, AG, AU, BB, BZ, CA, CY, GB, GD, GH, GM, IE, IL, KE, LC, LK, LS, MN, MW, NZ, OM, SD, SG, SL, SZ, TT, TZ, UG, ZA, ZM, ZW only)*: **UNILEVER PLC** [GB/GB]; Unilever House, Blackfriars, London EC4P 4BQ (GB).

(71) Applicant *(for AL, AM, AT, AZ, BA, BE, BF, BG, BJ, BR, BY, CF, CG, CH, CI, CM, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, FR, GA, GE, GN, GQ, GR, GW, HR, HU, ID, IS, IT, JP, KG, KP, KR, KZ, LR, LT, LU, LV, MA, MC, MD, MG, MK, ML, MR, MX, MZ, NE, NL, NO, PH, PL, PT, RO, RU, SE, SI, SK, SN, TD, TG, TJ, TM, TN, TR, UA, UZ, VN, YU only)*: **UNILEVER NV** [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL).

(71) Applicant *(for IN only)*: **HINDUSTAN LEVER LIMITED** [IN/IN]; Hindustan Lever House, 165/166 Backbay Reclamation, Maharashtra, Mumbai 400 020 (IN).

(72) Inventors: **ADOLPHI, Ulrich**; In der Lau 24, 21335 Lueneburg (DE). **COCKINGS, Terence, Richard**; Unilever R & D Colworth, Colworth House, Sharnbrook, Bedford, Bedfordshire MK44 1LQ (GB). **JULIO, Sergio, Mauricio, Ehrhardt, Ferreira**; Unilever Brazil Kiborn, Rua Santo Arcadio, 304-Brooklin, CEP 04707-110 Sao Paulo (BR). **LUCK, Richard, Henry**; Unilever R & D Colworth, Colworth House, Sharnbrook, Bedford, Bedfordshire MK44 1LQ (GB).

(74) Agent: **HUGOT, Alain, Eric, Philippe**; Unilever PLC, Patent Department, Colworth House, Sharnbrook, Bedford, Bedfordshire MK44 1LQ (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 02/076233 A1

(54) Title: BACKPACK FOR SEMI-FROZEN PARTICULATE PRODUCTS

(57) Abstract: A backpack for dispensing a semi-frozen material comprising discrete granules by gravity flow comprising; a) an insulated hopper for storage of the material before it is dispensed which includes in its operative position i) a housing for receiving the granular material and ii) a funnel disposed to receive the granular material from the housing under the action of gravity; b) mounting means for mounting the hopper on a person in said operative position; c) an insulated valve operative to control release of the granular material from an opening in the funnel; d) an elongate flexible feed tube having in operative connection with the funnel opening such that when the valve allows release of the granular material form the opening, the material falls under gravity into the feed tube, and e) an outlet port at end of the feed tube and configured to allow directed dispensing of the granular material.

BACKPACK FOR SEMI-FROZEN PARTICULATE PRODUCTS

Field of the Invention

This invention relates generally to a portable dispenser for a particulate product. More particularly, the invention relates to a backpack that can be supported on an operator, for dispensing a semi-frozen, edible material comprised of discrete granules.

Background Art

The term "semi-frozen" herein shall be used to describe material or compositions containing water of which at least some part exists in the form of ice.

Frozen and semi-frozen, edible material is typically dispensed from fridges or other refrigeration devices that are set at a temperature suitable to maintain the physical state of the material that is desired for presentation to the consumer. The present invention is directed to semi-frozen particulate matter that is to be presented as discrete granules. In such a form the granules are characterised by their ability to move relative to eachother, such that the material as a whole may "flow". This allows the consumer to pour the material into his mouth for consumption.

Where the semi-frozen material is particulate, and it is desired to dispense this material as discrete particles, it is important that the conditions of storage of the material are controlled to prevent bridging of particles. Semi-frozen particles that have partially melted become sticky and this causes them to clump together. In this state, bridged

particles lose their ability to move relative to eachother. As bridging only requires partial melting of the semi-frozen particulate matter, such matter has not been dispensed at locations remote from its place of refrigeration. This has substantially restricted the number of environments in which such products can be dispensed.

Accordingly there exists a need in the art to provide means by which these materials can be dispensed at locations remote from refridgeration but which takes into account the thermal and physical properties of the material.

Although there is a significant amount of art directed to portable devices for food dispensing, and in particular dispensers for liquid beverages that can be borne by a person as a backpack, these dispensers typically require mechanical means to force the liquid from their respective containers, or rely on pressure transfer between two or more fluid phases within the backpack. Such mechanisms are unsuitable for remote dispensing of a semi-frozen material comprised of discrete particles.

US Patent Nos. 4,896,402 and 5,199,609 (Ash) disclose a rigid dispenser tank with an outer insulated jacket and an interior, gas impermeable flexible bladder which receives the beverage to be dispensed. Pressurised gas is fed into the space between the tank and the flexible liner such that, as the pressure increases, the bladder collapses to urge the liquid out from it into a dispensing hose.

US Patent No 4,098,434 (Uhlig) discloses an non-insulated fluid product dispenser having first and second containers, the second being positioned within the first. The fluid to be dispensed is introduced into one of the containers and

fluid under pressure is introduced into the other container. One of the containers is sealed such that a mechanical force applied to the dispenser as a whole results in a pressure build-up which urges the product fluid through a dispensing nozzle or opening provided in the unsealed container.

US 4,629,098 discloses a portable liquid dispenser where the pressure used to dispense the liquid is generated by a hand-pump. The pump consists of a bulb of air which the operator compresses to feed air along one longitudinal passage of a dispensing tube, into a dispenser whereby the liquid is forced in the opposite direction through a second longitudinal passage in the dispensing tube. This mechanism works more efficiently with a thin dispensing tube.

Such extrusion using fluid pressure is unsuitable for a product comprised of discrete particles; any mechanism that relies on pressure transfer requires the product to be dispensed to be in a continuous phase. The use of two bladders would, for example, crush the semi-frozen particulate product.

US Patent No. 6,082,589 (Ash et al.) discloses a dispensing system for semi-frozen slush that can be carried within a backpack. This comprises a thermally insulated vessel that is removably supported on a base unit containing a gas pressurizing mechanism and a motor connected to an electrical source. The gas pressurizing mechanism is controlled by a pressure sensor to maintain the pressure on the beverage inside the container, and an agitator within the vessel is connected to the motor shaft to effectively swirl the beverage to prevent it from separating. The agitator system includes a plurality of blades mounted on shaft. The document does teach that the gas pressurizing

mechanism can be bypassed - but not removed - to allow gravity dispensing, but this does not function when the slush drops beneath a certain level in the vessel. The pressurizing mechanism, agitator system and the requisite power source contribute significantly to the overall weight of the dispenser.

This apparatus is suitable for a semi-frozen slush delivery system as the slush provides a continuous medium to which pressure can be transferred. It is not suitable for discrete particles to be dispensed in accordance with the present invention. The provision of a motor driven agitator is also disadvantageous; material composed of discrete particles will provide greater resistance to the movement of an agitator through it than the slush and the effects of agitation, in being localized to a small portion of the particles, would cause these particles to fragment.

WO95/16634 (McInnes) relates to a self-contained portable device for the dispensing fluids and foodstuffs such as ice cream which can be mounted on the back of a human operator. The discharge of the contents of the device relies upon the action of a propellant that is stored in a pressurized container on the device. This propellant is released into the vessel whereby it acts on a piston or diaphragm to "energize" the ice cream and push it through a discharge valve. The action of the diaphragm to force fluids and ice cream through the discharge arm requires these materials to have a continuous phase and therefore renders it unsuitable for discharge of discrete particulate material. Further, for remote vending of ice cream in particular, a separate cooling means is provided in this apparatus.

US Patent No. 6,089,477 (Dillon) describes a backpack for distribution of chemicals, which may include particulate material such as pellets. Frozen and semi-frozen materials are not disclosed. The chemical is stored in a hopper which includes an agitation means to prevent the materials from sticking together. A flexible pipe feeding directly from the outlet of the hopper terminates in a dispensing gun that expels the chemicals through a front nozzle. An impeller that is a driven by an electrical motor facilitates the expulsion of chemicals.

The use of a nozzle and dispensing gun in this apparatus is intended to distribute the material over as large an area as possible. A more localized delivery of particulate material is required for food dispensing. Additionally the requirement for a power source is a disadvantage for distribution in more remote areas. Further, the agitation of the chemicals is achieved using a double ratchet assembly that is rotated by the user. The assembly is located near the outlet port of the hopper and appears to have the function of preventing clumping at the outlet port. Any concomitant disadvantage from fragmentation of the pellets is not too disadvantageous to the device as it seeks to dispense chemicals as broadly as possible and smaller fragments will be projected further.

Consequently a need exists in the art for a device, portable as a backpack, that can effectively dispense discrete, particulate semi-frozen material.

It is a further object of the invention for dispensing to be achieved safely and to allow the user suitable control of the rate and position of delivery.

It is also an object of the invention to provide an apparatus that can preserve the integrity of the semi-frozen material as discrete granules for an adequate time period at a distance remote from refrigeration, without the inclusion of mechanical devices or complex cooling means which add weight to the device and reduce its portability.

It is a further object of the invention to provide a backpack that is safe and hygienic, simple to use and economical in manufacture.

These and other objects of the invention are achieved by the following invention of which a first aspect is a backpack for storing and dispensing a semi-frozen material comprised of discrete granules, said backpack comprising; a) an insulated hopper for storage of the material before it is dispensed, said hopper including in its operative position i) a housing for receiving the granular material and ii) a funnel disposed to receive the granular material from the housing under the action of gravity, the funnel tapering downwardly to an opening which has a cross-section sufficient to allow the granular material to pass therethrough under the action of gravity; b) mounting means for mounting the hopper on a person in said operative position; c) an insulated valve operative to control release of the granular material from the funnel opening; d) an elongate flexible feed tube having i) a smooth inner surface, ii) a proximal end in operative connection with the funnel opening such that when the valve allows release of the granular material from the opening, the material falls under gravity into the feed tube, iii) a distal end positionable beneath the proximal end to allow movement therefrom gravity towards the distal end; e) outlet port

disposed at the distal end of the feed tube and configured to allow directed dispensing of the granular material.

Preferably the backpack has a mass when empty of less than 15kg. More preferably the mass should be less than 12kg and more preferably less than 8kg.

The backpack should be suitable for dispensing, under environmental conditions of 35°C and 70% humidity, semi-frozen particulate material, introduced into the backpack at a filing temperature between -20°C and -25°C, as discrete granules for a period of at least sixty minutes. Preferably, the dispensing period is at least 90 minutes and more preferably greater than 120 minutes.

The hopper should be of a suitable size to be mounted on the person and preferably of a size suitable to fit comfortably within the area defined by the back of the operator on whom the backpack is to be mounted. However, for practical reasons, the hopper should have a volume greater than 4 litres. It is preferable that the hopper has a volume greater than 6 litres and more preferably greater than 8 litres.

Although, no particular limitation is envisaged for the shape of the hopper, it is preferable that the funnel of the hopper has an excentric shape such that when the hopper is mounted the funnel opening will be positioned to the left or right side of the operator. This minimises the length of the elongate feed tube and thereby reduces the contact time of the semi-frozen granules with the feed tube.

Any wall provided in the hopper is thick or strong enough to ensure that the hopper remains rigid during handling and

dispensing. Each wall of the hopper is preferably comprised of at least two layers, an inner layer which is in contact with the material to be dispensed and an outer layer comprised of insulating material.

The inner layer may be made of cardboard, plastic or any other material suitable for use with food hereinafter referred to as food grade material. Suitable plastic materials for the inner layer include polyethylene (PE), polystyrene (PS), polypropylene (PP), acrylonitrile butadiene styrene (ABS) and polyvinylchloride (PVC). Preferably the plastic material comprises high impact polystyrene or polyvinylchloride (PVC). When the inner layer is comprised of card it is preferable to coat the inside with a sealable material, with polyethylene being particularly suitable for this purpose. Preferably, the outer layer is comprised of expanded polystyrene.

The walls of the hopper may comprise a third layer, which is preferably a second outer layer positioned outermost on the walls of the hopper. The purpose of this layer is to provide additional insulative or advantageous thermal effects, or to provide for waterproofing of the hooper. Preferably the third layer is comprised of neoprene, or a coating that reflects light at wavelengths corresponding to that of infrared radiation.

In accordance with a preferred embodiment of the invention a plurality of baffles may be included within the hopper which are comprised of the food grade plastic material. The baffles must be positioned to regulate the downward movement of the granular material from the housing into the funnel or the feed tube. Instead of falling vertically downward as the granules are received in the hopper, the baffles may deflect

them such that the movement is slowed to minimse impact of the added material to that material already present in the hopper.

When the valve or the base of the funnel is closed, material received in the hopper builds up in the funnel and / or feed tube such that it may occupy space within the housing itself. Such baffles may be provided to separate quantities of the granular material to be dispensed to lessen the effective weight acting granules that are at the base of the funnel or feed tube and are restrained by the valve. When the valve is opened the granular material rolls off the baffles to fill the volume left by the dispensed granules. The baffles are preferably positioned within the hopper to restrict agitative motion of the granules which may be caused when the carrier's movement is jolting or uneven.

The valve positioned at the funnel opening is also insulated. The valve may be comprised of insulating material but it is preferred that this insulation is effected by adhering an insulating material to the outside of the valve such that this material is at least partially co-extensive with the outer layer of insulation provided on the walls of the hopper. The insulated area of the hopper and valve may then be optimised.

The valve should be controlled by the person on whom the backpack is mounted. For this purpose the valve may comprise an operating mechanism that extends from the valve to a position such that it may be controlled by the hand of the operator. Such an operating mechanism must disrupt the insulating material or insulating effect of the valve to the smallest extent possible.

In accordance with two preferred embodiments of the invention, the hopper further includes a short receiving tube attached to the base of the funnel at the funnel opening. The proximal end of the feed tube is positioned within and extends at least partially along the length of the receiving tube. The feed tube is positioned concentrically within the receiving tube such that the distance between the external diameter of the feed tube and the internal diameter of the receiving tube is not sufficient to allow granular material or fragments thereof to enter. In both embodiments the feed tube itself acts as the valve for controlling dispensing of the granular material from the backpack and the feed tube is provided with an aperture of sufficient cross-section to allow granular material to pass therethrough.

In accordance with the first of these two preferred embodiments, the feed tube aperture is provided on the circumference of the tube. The feed tube is adapted for rotation within the receiving tube. The rotation of the feed tube defines a) an open position whereby the feed tube aperture is directly adjacent the funnel opening such that granular material may passes into and along the feed tube; and b) a closed position whereby the feed tube is rotated such that the aperture is completely removed from the funnel opening.

In accordance with the second of these preferred embodiments, the aperture in the feed tube is provided at the proximal end thereof. The feed tube defines a closed position whereby the aperture of the tube is positioned above the funnel opening such that the body of the feed tube prevents the granular material from entering therein. The feed tube defines an open position whereby longitudinal

movement of the feed tube along the receiving tube moves the aperture to a position below the funnel opening such that granular material may fall into said feed tube.

Preferably in these two embodiments the feed tube is connected to the receiving tube of the hopper, and more preferably connected either to permit movement of the feed tube along the receiving tube and / or to allow rotation of the feed tube within the receiving tube. In one alternative it is preferred that the feed tube and receiving tube are provided with a corresponding screw thread. In the alternative, it is preferred that the feed tube is connected to the receiving tube by resilient means. Where the feed tube is to be rotated, the resilient means preferably comprises a torsion spring. Where the feed tube is to be moved longitudinally within the receiving tube it is preferred that the resilient means comprises a tension spring.

The resilient means is preferably configured to urge the feed tube into the closed position such that work has to be done against the resilience to release granular material from the hopper.

As an additional feature eutectic material of suitable shape may be fixed to the hopper or to the valve. When fixed to the hopper they should preferably be located near the top of the housing and / or in any lid provided thereon. Where the walls of the hopper comprise an inner layer and at least one outer layer the eutectic material should be placed between the inner layer and these outer layers. The outer envelope of the eutectic material should be constructed from lightweight to minimise the additional weight it confers on the backpack.

It is preferable that the elongate feed tube of the present invention be at least partially flexible to facilitate the operator's positioning of the tube and outlet port for dispensing. The feed tube may also be provided with an insulating outer layer.

The mounting means comprises any device suitable for supporting the weight of the hopper when full of the semi-frozen granular product and preferably for comfortably distributing the weight about the back of the carrier. It is preferred to mount the hopper on a frame comprised of reinforced plastic or a lightweight alloy. At least one strap may be secured to the frame that may then be attached to the operator. Shoulder straps may be used together or separately from a transverse strap borne across the chest and / or the torso of the operator. It is envisaged however that such straps may be attached directly to the hopper for use as mounting means without the need for a frame. However, when mounted using a frame, the frame should be configured to allow at least one gap to exist between the frame and the person bearing it. Such gaps may be left as air gaps or filled with an insulating material to limit any heat transfer from the operator to the backpack. Such gaps may further be filled with cushioning for the operator.

The hopper, valve, feed tube and outlet port should preferably be releasably attached to enable the dispensing apparatus to be disassembled to facilitate cleaning or replacement of these parts of the backpack to help maintain it as safe and hygienic for use

As the outlet port is to dispense a food material this outlet should prevent dust and the like from entering.

Preferably, the outlet port is provided with a dust cap, which can be applied to the outlet port when dispensing from the backpack is not occurring.

A second valve may be provided between the distal end of the feed tube and the outlet port in order to provide additional control of the dispensing of the granular material.

When the backpack apparatus according to any of these embodiments is not in use the flexible feed tube may be secured to the operator. This is preferably achieved by the use of at least one clip positioned towards the distal end of the feed tube which can be attached to a garment or belt of the operator. By being positioned at the distal end removing the clip to restore the apparatus to an operative position can easily be achieved manually by the operator.

According to a second aspect of the invention there is provided a method for dispensing a semi-frozen material comprised of discrete granules, comprising the steps of; a) feeding a volume of the semi-frozen granular material into an insulating hopper; b) mounting the hopper for transportation by a person; c) transporting the granular material within the hopper to a location remote to the point of refrigeration; d) controlling the release of the granular material under gravity from the hopper by means of a valve and elongate feed tube; e) confining the dispensing the granular material by means of an outlet port disposed at the end of the elongate feed tube; and characterised in that said step of transporting the granular material in the hopper comprises minimising agitation of the granular material in the hopper.

For clarity, hereinafter the term "dispensing apparatus" will be used to represent those parts of the overall backpack which are mounted on the mounting means.

As an aid to understanding the invention, preferred embodiments will now be described, by way of example, only and not in any limitative sense with reference to the accompanying drawings, wherein:

Fig 1a is a perspective view of the backpack in its operative position, in accordance with a preferred embodiment of the present invention.

Fig 1b is an exploded perspective view of the backpack shown in Fig. 1a.

Fig. 2 is a longitudinal section through the hopper as shown in Fig. 1

Fig. 3a is a sectional view through the base of the hopper showing a preferred embodiment for the valve of the present invention in a closed position.

Fig. 3b is a sectional view through the base of the hopper showing a preferred embodiment for the valve of the present invention in an open position.

Fig. 4a is a sectional view through the base of the hopper showing an alternative preferred embodiment for the valve of the present invention in a closed position.

Fig. 4b is a sectional view through the base of the hopper showing an alternative preferred embodiment for the valve of the present invention in an open position.

Fig. 5a to 5d are sectional views through the base of the funnel, the valve and the elongate feed tube showing alternative preferred embodiments of the valve.

Fig. 6 is a longitudinal section through the hopper in accordance with an alternative embodiment of the present invention.

As shown in fig. 1a and 1b the backpack (1) comprises a frame (2) on which the dispensing apparatus is mounted. The frame (2) comprises vertical straps (3) for securing the backpack (1) to the operator and transverse straps (4) for assisting in the distribution of weight across the back of the operator. The straps (3,4) are provided with moveable fasteners (5) to enable the frame to be securely mounted on operators of different sizes.

An air gap (6) is provided in the frame (2) that provides for additional insulation between the frame (2) and the dispensing apparatus.

A cup holder (7) is attached to the outside of the dispensing apparatus such that the operator is not required to manually carry the cups or dispensers.

The dispensing apparatus that is mounted on a frame (2), as illustrated in figs 1a and 1b comprises a hopper (8) that holds the semi-frozen granular material herein. The hopper (8) is divided into a housing (9) and a funnel (10). A removable lid (11) is provided on the top of the housing (9), the lid being shown in part section in fig. 1b. The opening of the housing (9) covered by the lid has a large enough cross-section to enable the granular material to be

easily fed into the hopper (8) and to enable manual cleaning of the inside surfaces of the hopper (8).

A funnel (10) is disposed beneath the housing (9) and can receive granular material from the housing (9) under the action of gravity when the backpack (1) is in the operative position shown in fig 1a and 1b. The funnel (10) has an excentric shape such that it tapers downwardly and to the left of the operator. It also tapers downwardly to an opening (13) the cross-section of which is sufficient to allow the granular material to pass therethrough under the action of gravity.

As shown in fig. 2, the housing (9), the funnel (10) and the lid (11) are each comprised of a rigid plastic inner layer (100) on which is adhered an outer layer (101) of insulating material, such as open cell foam or expanded polystyrene. The inner surface (100) of the inner layer is smooth to present a more hygienic surface in contact with the granular material received in the hopper (8).

A flexible, elongate feed tube (14) is releasably attached at its proximal end (15) to the hopper (8). The feed tube (14) also includes a distal end (16) that is disposed vertically beneath the proximal end (15) when the backpack is in its operative position as shown in figs 1a and 1b. Granular material entering the proximal end (15) will move under gravity along the length of the feed pipe (14) that has a smooth inner surface to facilitate this movement.

The operator of the backpack (1) may of course vary the vertical displacement between the two ends of the feed tube (14), which will in turn control the rate at which the material passes through the feed pipe. The length of the

feed tube (14) is sufficient for it to pass round the body of the operator such that he may manually hold and comfortably manoeuvre the distal end (15)

An outlet port (17) is attached to the distal end (16) of the feed tube (14). The outlet port (17) is shaped to allow directed dispensing of the granular material such that it may be channelled into a sized receptacle, such as a typical paper cup. A dust cap (19) may be placed over the outlet port (19) when the outlet is not in use; this prevents insects, dust and sand from entering the feed tube and contaminating the product. The dust cap (19) is attached to the outlet port by a resilient chord (20).

Figs. 3a, 3b and 4a and 4b describe two embodiments of valves which may be included in the dispensing apparatus described thus far with reference to figs. 1 and 2. In both cases the feed tube acts as a valve defining open and closed positioned with respect to the funnel opening. In these figures the funnel (10) is provided with an opening (33,43) that is disposed vertically in the operative position shown. A receiving tube (30,40) is attached to the funnel (10) such that the openings (33,43) are enclosed. As it is part of the hopper, the receiving tubes (30, 40) are provided with an insulating outer layer (101) and an inner layer (100) of food grade material.

In figs. 3a and 3b the valve is defined by a feed tube (114) which is positioned within the receiving tube (30). The dimensions of the feed tube (114) are chosen such that it is free to rotate relative to the receiving tube (30) but does not provide a gap between itself and the feed tube into which the granular material, or fragments thereof may easily pass. The feed tube (114) is provided with an aperture (32)

which has a cross-section at least as great as that of the funnel opening (33). In the closed position of the valve shown in fig. 3a the aperture (32) is completely removed from the opening (33) such that not even partial communication therebetween is possible.

The feed tube (114) can be rotated from the closed position of Fig. 3a to the open valve position as illustrated in Fig. 3b. The aperture (32) is directly adjacent the opening (33) to allow communication therebetween. The opening (33) and the aperture (32) both allow granular material to pass therethrough under the action of gravity, such that the granular material passes into the feed tube (114) and along its length in the direction shown. When a sufficient amount of the granules has been dispensed the feed tube (114) may be rotated back to the closed position shown in Fig. 3a.

Fig. 4a and 4b illustrate a delivery tube valve mechanism whereby the feed tube (214) is provided with an aperture (42) on the top of the feed tube. In the closed position shown in fig. 4a the aperture (40) is positioned vertically above the opening (43) of the funnel (10) such that granular material may not enter the feed tube under the action of gravity. The feed tube (214) is pulled downwards within the receiving tube (40) to move it into the open valve position shown in Fig. 4b, whereby the aperture (42) is positioned beneath the opening (43).

Resilient means in the form of a torsion spring (34) in fig 3a and 3b and a tensile spring (44) in fig. 4a and 4b provide the operator with better control of the discharge of the granular material using the valves of these embodiments. When the feed tube is rotated or pulled downwards into its respective open positions, the resilient means (34,44) urge

movement in the opposite direction to close the opening (33,43) of the funnel (10). This reduces the likelihood of accidental discharge of the material as work has to be done against the resilience to move the valves in to their respective open positions.

That part of the feed tube (114,214) that is provided within the receiving tube (30,40) has a vertical inclination that facilitates the movement of granular material along the feed tubes (114,214) under the action of gravity. The feed tube (114,214) in both cases extends from the receiving tube (30,40) to its point of attachment to the outlet port. Manual control of the outlet port may be used to effect the rotation or movement of the feed tube (114,214).

It is noted in both these embodiments that the layer of insulating material (101) provided on the funnel (10) and the proximal end (16) of the feed tube (14) at least extends beyond the operative part of the valve. In fig. 4b, the insulation covers the extent to which the delivery tube (40) may be downwardly extended.

Figs. 5a to 5d are directed to alternative embodiments of the valve (53, 153, 253) which can be included in the dispensing apparatus. In each case, the valves (53, 153, 253) are releasably attached to the base of the funnel (50) and define open and closed positions with respect to the opening of the funnel (50). The funnel (50) is comprised of an inner layer (51) of food grade material, and outer insulating layer (52) and an opening which is here disposed horizontally when the hopper is in its operative position. The insulating material (52) which defines the outer layer of the funnel (50) is not broken by the provision of these valves (53, 153, 253) such that no gaps will occur in the

insulation of the food grade material layer from the valves (53, 153, 253) upwards.

The singular valve shown in Figs 5a and 5b comprises a slide (53) which has a width greater than that of the funnel opening. The slide (53) is provided with a solid portion (54) and a hollow portion (55) that defines an aperture having the same cross-sectional area as the funnel opening. Fig. 5a defines a closed position of the valve whereby the solid portion (54) prevents the release of granular material (57) from the funnel (50). Using the knobs (56) provided at the ends of the slide (53), the latter may be pushed such that the aperture of the hollow portion (55) lies directly beneath the funnel opening (Fig.5b). Granular material (57) may then pass through into the feed tube. When a sufficient amount of the material (57) has been dispensed the slide (53) may be pushed back to the closed position of Fig. 5a.

The knobs (56) may be moved directly by the operator of the backpack. A handle or equivalent means may additionally be attached to the knobs (56) for added convenience of operation.

In figures 5c and 5d the singular valve as shown in figs 5a and 5b can be adapted to allow for volumetric dosing. Two such slides are employed one above the other with respect to the funnel opening. As shown in fig. 5c, a first slide (153), when not in use the closes the opening of the funnel (50). When the first slide (153) is moved in the direction indicated by the arrow, granular material (57) may pass into the space defined by chamber (154) interposed between the first and second (253) slides. When the chamber (154) is full the first slide (153) is closed. The second slide (253) may then be opened as shown in Fig. 5d to release the

material (57) within the chamber (154) under the action of gravity. The chamber (154) has a defined volume which would correspond to a single dose of semi-frozen granular product (57).

In figure 6 an alternative embodiment for the hopper (60) is shown which may be included in a backpack with any other embodiments of the valve, feed tube or outlet ports as described above. The hopper (60) is comprised of a housing (61) which is closed by a lid (63), and a funnel (62) as in the operative hopper described with reference to figs 1 to 3. A plurality of baffles (64) are however disposed at intervals vertically within the housing (61) and funnel (62) and are attached to the walls of the hopper (64). (The attachment of one baffle (64) cannot be shown in longitudinal section). The baffles (64) extend downwards at an angle to the wall but do not extend completely to the opposite walls in order to ensure that downwards movement of the granules is not prevented. Granules (65) are received through the lid (63) on the housing (61) and they will contact the baffles (64) and be deflected such that their downward rate of movement is slowed. This helps prevent fragmentation due to collision of the granules (65) with the base of the funnel (62) or material already contained within the funnel (62).

When a valve (66) provided at the base of the funnel (62) is closed the granular material (65) received in the hopper (60) builds up in the funnel (62) such that it occupies space within the housing (61) as shown. The baffles (64) separate quantities of the granular material (65) to be dispensed, thereby lessening the effective weight acting on those granules (65) which are at the base of the funnel and which are restrained by the valve (66).

The hopper (60) is provided with an inner layer (600) of food grade material from which the baffles (64) are also made. An outer insulating layer (601) is also provided which has a considerably greater thickness at the funnel / base of the hopper (60) than at the housing (61) top of the hopper (60).

Example

i) The product

A product having the form of semi-frozen discrete particles of approximately spherical shape at temperatures less than -10°C are to be vended remotely from their point of refrigeration. The spheres are made from a mix having a high water content (>80%) and an overall acid pH, the mix further comprising sugars, protein, fat, sweeteners, stabilisers, emulsifiers, flavours and colouring agents and acids. The spheres have diameters in the range 1 to 20 mm.

ii) The backpack

In accordance with the embodiment shown in figures 1a, 1b and fig. 3a and 3b, the backpack comprises a hopper including a funnel and housing which together define an internal volume of c. 9 litres for the storage of semi-frozen, discrete granules of material. The funnel of the hopper is provided with an opening having dimensions of 35mm x 70mm. The inner layer of the housing, funnel and receiving tube provided in the hopper is comprised of polyvinylchloride such that each of these are acid-resistant. The outer layer is comprised of expanded polystyrene.

The feed tube and the receiving tube are of cylindrical form. The feed tube is comprised of polyvinylchloride and is flexible such that the part of the feed tube that extends from the receiving tube can be manoeuvred vertically and horizontally by the person on whom the backpack is mounted. The feed tube has a diameter of c.35mm. The outlet port attached to the feed tube comprises a shaped nozzle and a flange, to which a dust cap is attached by a resilient chord.

ii) Method of dispensing

Up to five 1kg bags of these granular spheres are removed from refrigerator -20°C and added to the hopper via the wide opening at the top of the housing. When the backpack is mounted in its operative position the spheres move under gravity down through the housing and collect at the opening of the funnel which is initially closed by the valve means. The operator of the backpack may rotate the outlet port to rotate the feed tube valve mechanism to its open position to thereby allow the spheres to fall under gravity into the feed tube. The provision of resilient means allows the operator greater control over the rotation of the outlet port and the delivery tube. The outlet tube may be rotated back to its original position to close the funnel opening and to thereby prevent further flow of the granular material. The vertical distance of the distal end of the feed tube from the proximal end can then be varied to increase or decrease the role of movement of the sphere. The movement of the tube in this way promotes fluctuation of the position of sphere within the tube and prevents any bridging of the spheres which would otherwise be a possibility as they are introduced from the insulated operative part of the

valve into the un-insulated part of the feed tube. When the spheres reach the outlet port the operator may prevent their immediate release by raising the outlet port. Progressive downward movement of the outlet port enables the rate of release of the spheres to be controlled. The configuration of the nozzle of the outlet port allows directed dispensing into the mouth of a cup that is held beneath it.

Claims

1. A backpack for storing and dispensing a semi-frozen material comprised of discrete granules comprising;

a) an insulated hopper for storage of the material before it is dispensed, said hopper including in its operative position

i) a housing for receiving granular material;

ii) a funnel disposed to receive the granular material from the housing under the action of gravity, the funnel tapering downwardly to an opening having a cross-section sufficient to allow the granular material to pass therethrough under the action of gravity;

b) mounting means for mounting the hopper on a person in said operative position;

c) an insulated valve operative to control release of the granular material from the funnel opening;

d) an elongate feed tube having

i) a smooth inner surface;

ii) a proximal end in operative connection with the funnel opening, such that when the valve allows release of the granular material, this material moves under gravity into the feed tube;

iii) a distal end positionable beneath the proximal end to allow movement of granular material under gravity towards the distal end of the feed tube; and

e) an outlet port at the distal end of the feed tube configured to confine the dispensing of the granular material dispensed therefrom.

2. A backpack according to claim 1, wherein the hopper comprises at least one wall, said wall comprised of at least two layers, an inner layer of food grade material, and an outer layer of insulating material.

3. A backpack according to claim 2, wherein the hopper further comprises a plurality baffles.

4. A backpack according to any one of claims 1 to 3, wherein the funnel of the hopper has an excentric shape.

5. A backpack according to anyone of claims 1 to 4, wherein the valve is manually controlled by the person on whom the backpack is mounted.

6. A backpack according to any one of claims 1 to 5, wherein the hopper further comprises a receiving tube positioned at the funnel opening.

7. A backpack according to claim 6, wherein the proximal end of the feed tube extends at least partially into the receiving tube.

8. A backpack according to claim 7, wherein the proximal end of the feed tube is connected to the receiving tube by a resilient means.

9. A backpack according to claim 7 or claim 8, wherein the feed tube is provided at its proximal end with an aperture of sufficient cross-section to allow granular material to

pass therethrough and whereby the valve of the backpack is provided by movement of the feed tube within the receiving tube by definition of;

a) an open valve position whereby the aperture of the feed tube is directly adjacent the funnel opening; and

b) a closed valve position whereby the feed tube aperture is completely removed from the funnel opening.

10. A backpack according to claim 9, wherein the movement between open and closed positions is provided by rotation of the feed tube within the receiving tube.

11. A backpack according to claim 9 or claim 10, wherein the movement between open and closed positions is provided by longitudinal movement of the feed tube within the receiving tube.

12. A backpack according to any one of claims 1 to 11, wherein the feed tube is at least partially flexible.

13. A backpack according to any one of claims 1 to 12, wherein the mounting means includes a frame to which at least the hopper is secured and at least one strap for securing the frame to the back of the person bearing the backpack.

14. A backpack according to any of claims 1 to 13, wherein the mounting means further comprises a flange enabling the backpack to be free standing in its operative position when not mounted on the person.

15. A method for dispensing a semi-frozen material comprised of discrete granules, comprising the steps of;

a) feeding a volume of the semi-frozen granular material into a insulating hopper;

b) mounting the hopper for transportation by a person;

c) transporting the granular material within the hopper to a location remote from the point of refrigeration;

d) controlling the release of the granular material under gravity from the hopper by means of a valve and elongate feed tube;

e) confining the dispensing the granular material by means of an outlet port disposed at the end of the elongate feed tube; and

characterised in that said step of transporting the granular material in the hopper comprises minimising agitation of the granular material in the hopper.

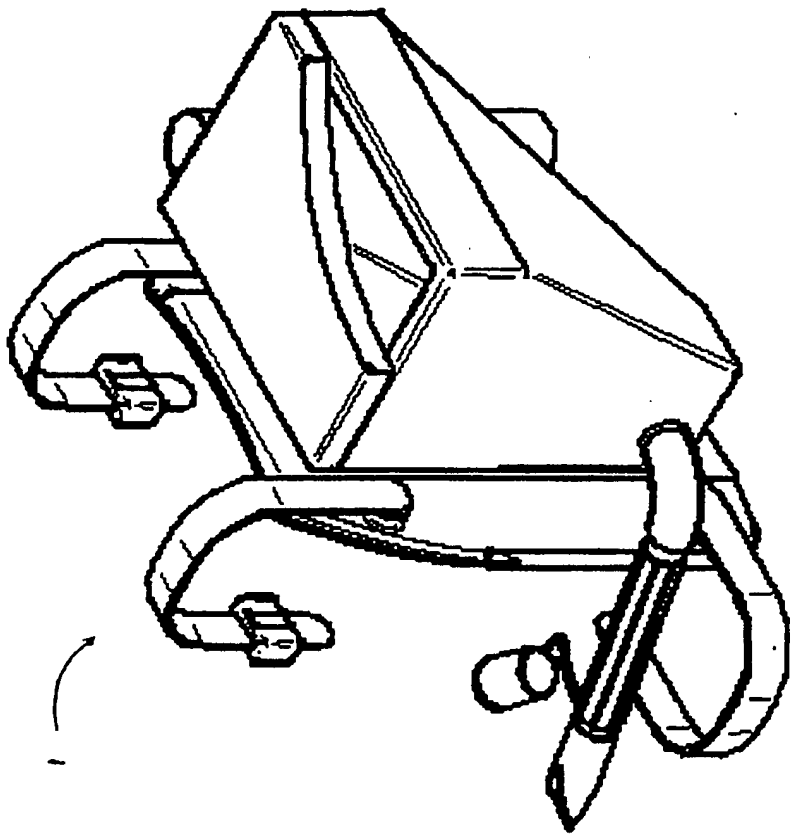

Fig. 1a

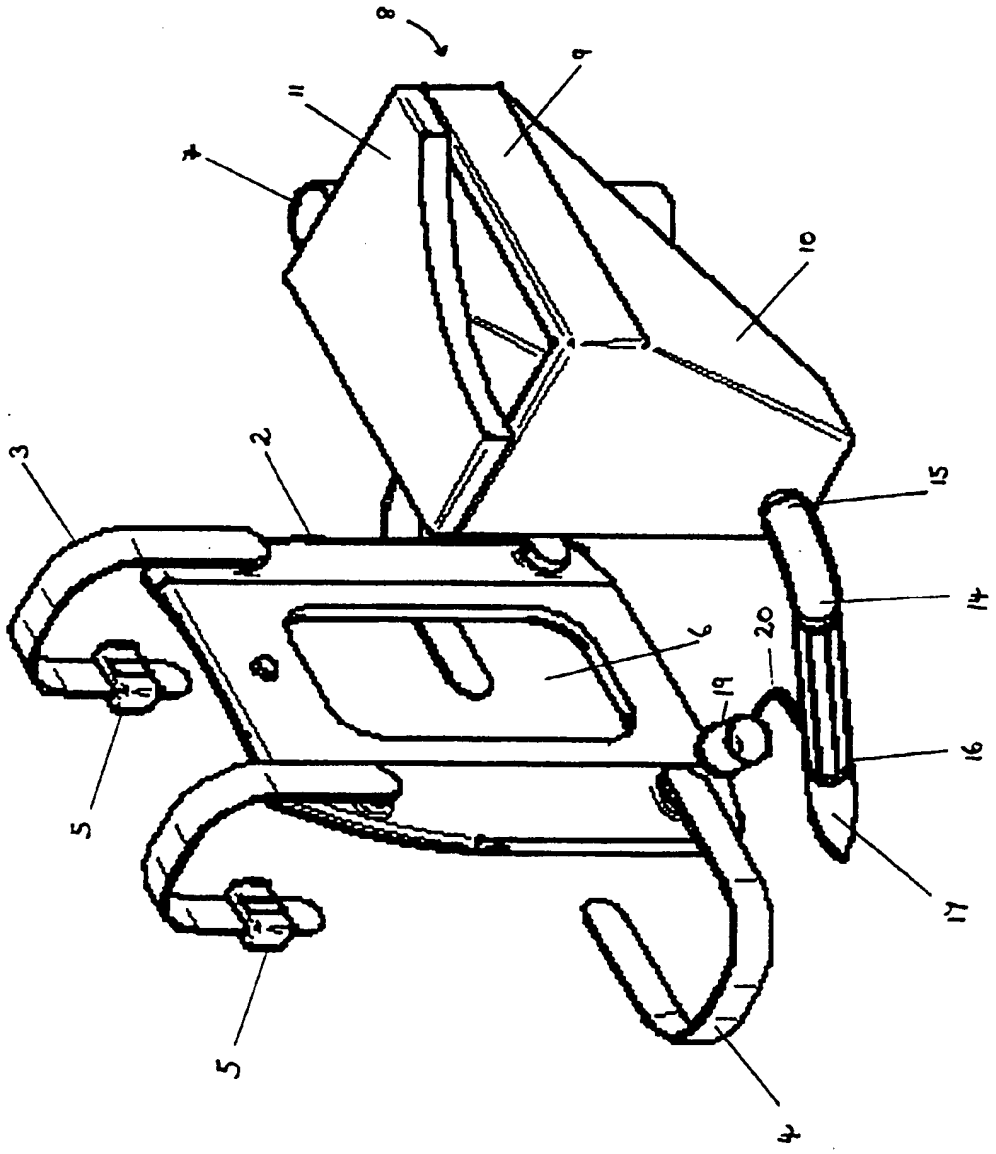

Fig 1b

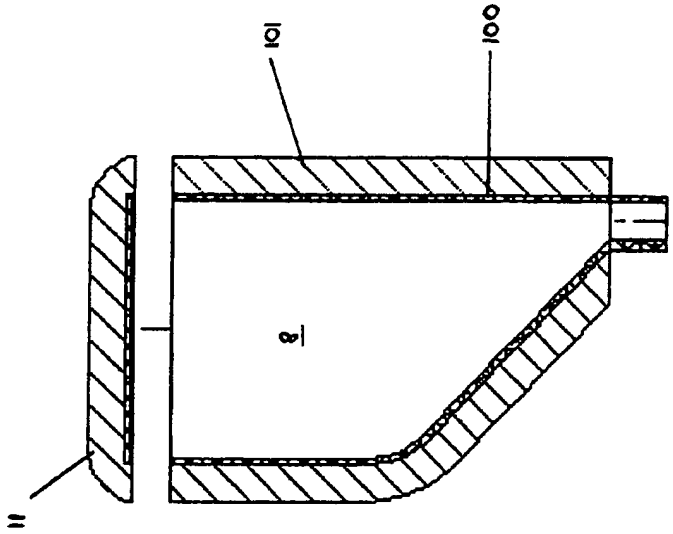

Fig. 2

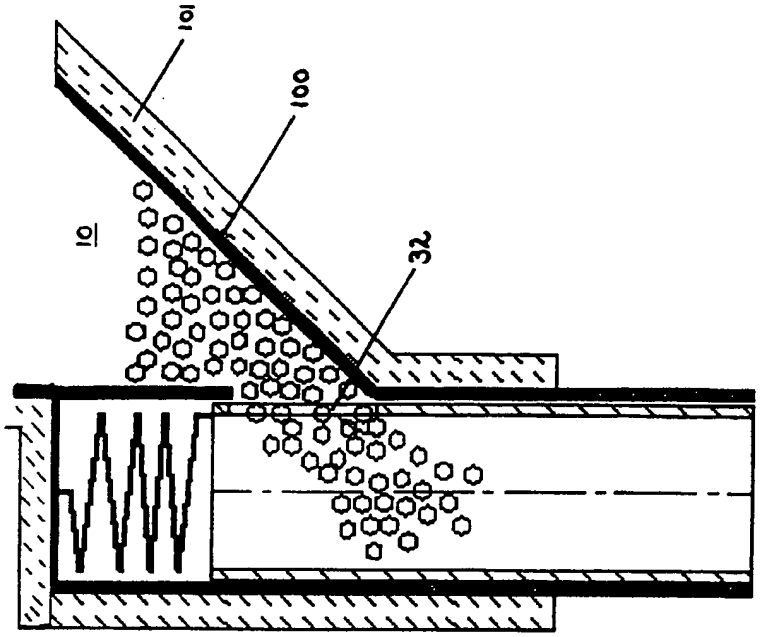

Fig. 3b)

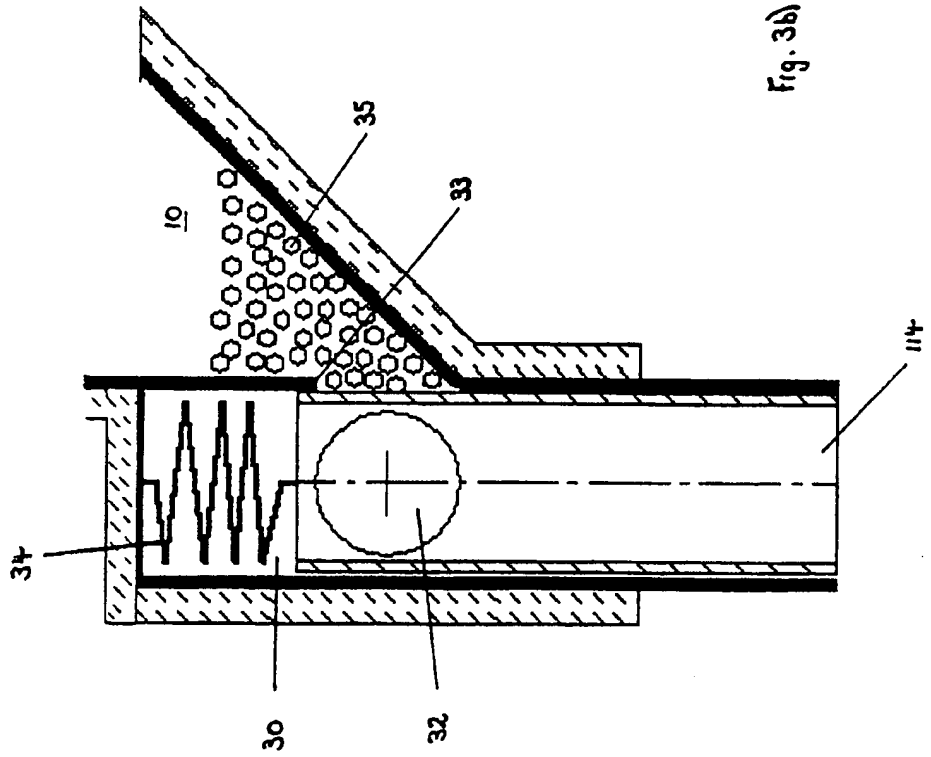

Fig. 3a)

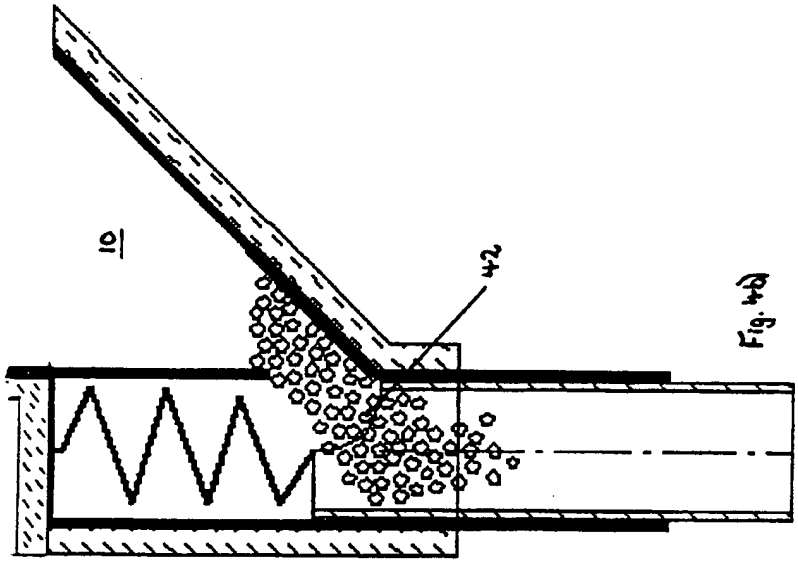

Fig. 4b)

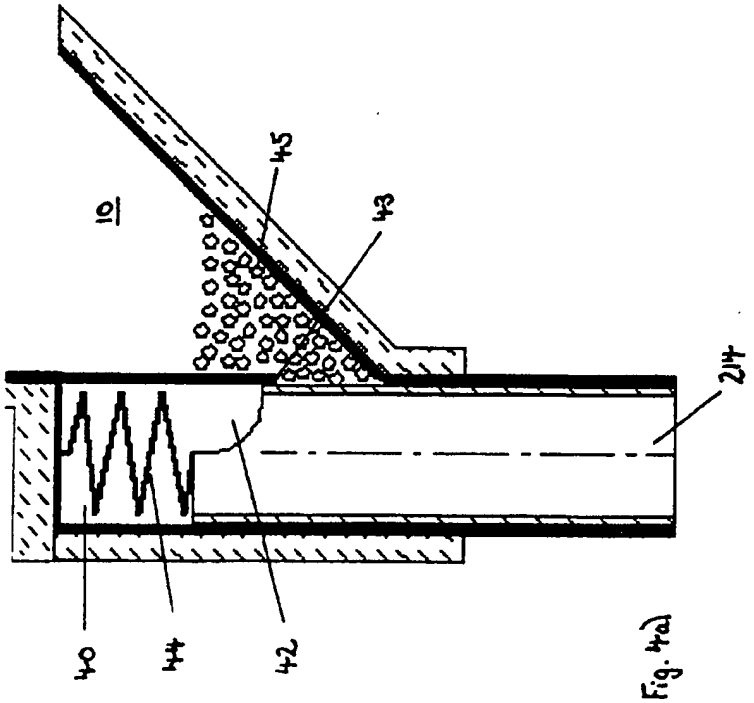

Fig. 4a)

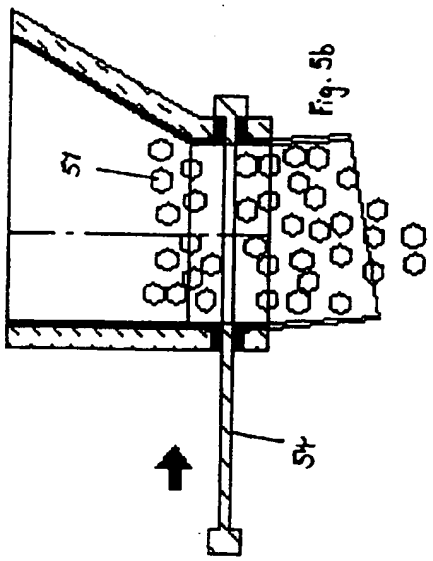

Fig. 5b

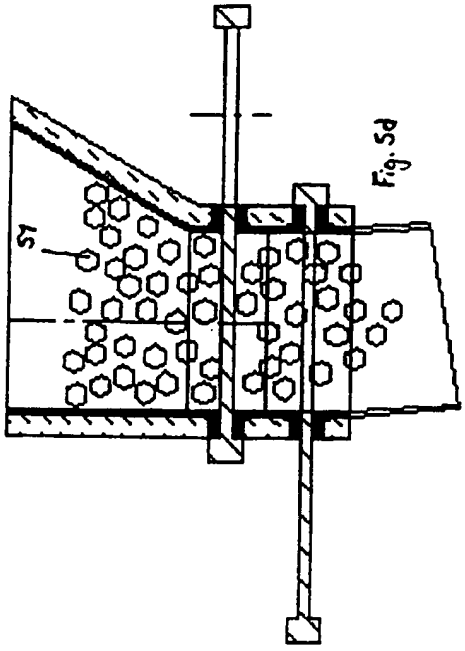

Fig. 5d

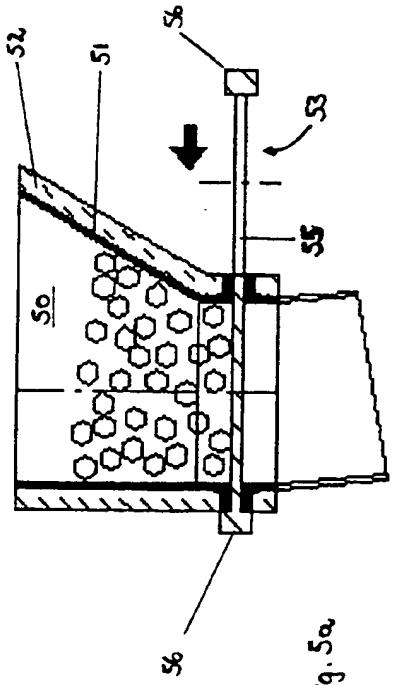

Fig. 5a

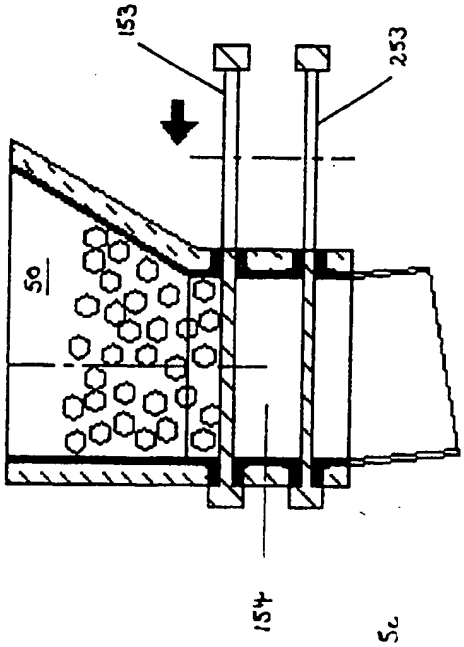

Fig. 5c

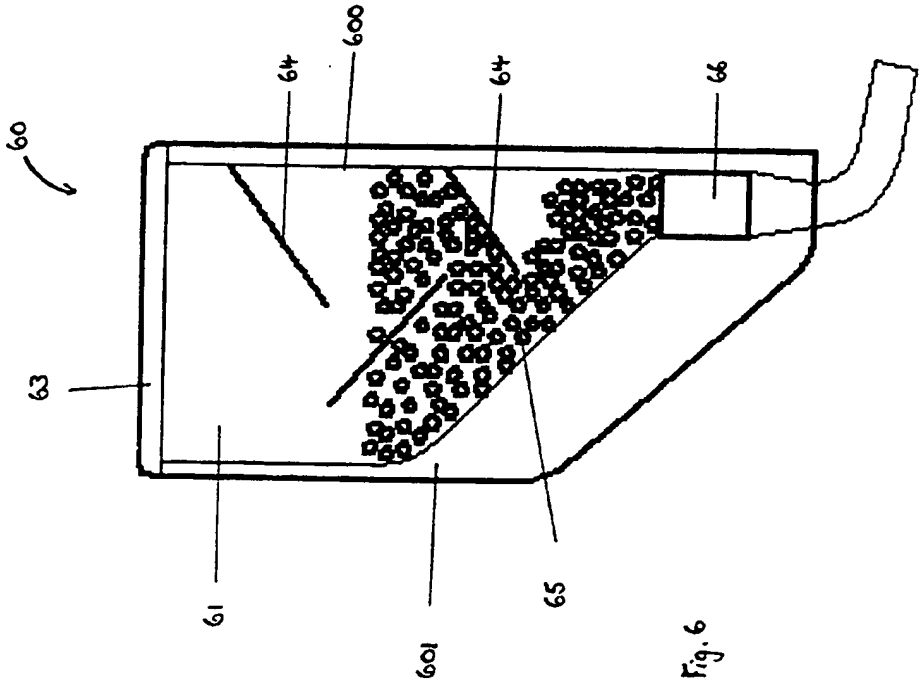

Fig. 6

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 02/03361

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A23G9/28 B67D5/02 B67D5/62 B65D83/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A23G B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 082 589 A (ASH FRED L ET AL) 4 July 2000 (2000-07-04) cited in the application	1,2,5-7, 9,12-15
Y	the whole document	3,4
Y	US 4 817 827 A (KITO YOSHIKAZU ET AL) 4 April 1989 (1989-04-04) column 1, line 15 - line 25	3,4
X	DE 33 23 898 A (LANG ALFRED;LAZAR MAX) 3 January 1985 (1985-01-03) the whole document	15
A	US 2 684 787 A (E.B. CHARPIAT) 27 July 1954 (1954-07-27) the whole document	1,12,14, 15

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 August 2002	04/09/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Guyon, R

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 02/03361

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 089 477 A (DILLON PATRICK) 18 July 2000 (2000-07-18) cited in the application column 3, line 47 - line 57; claims; figures	1,5-7,9, 12-15
Y	US 4 215 803 A (SCHAFER ALBERT L) 5 August 1980 (1980-08-05) the whole document	1,5-7,9, 12-15
A	US 6 098 849 A (MCINNES GREGORY CHARLES) 8 August 2000 (2000-08-08) cited in the application the whole document	1
A	US 4 629 098 A (EGER DOUGLAS R) 16 December 1986 (1986-12-16) cited in the application the whole document	1
A	US 6 056 949 A (MENZI HEINI ET AL) 2 May 2000 (2000-05-02)	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 02/03361

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6082589 A	04-07-2000	US 5772075 A	30-06-1998
US 4817827 A	04-04-1989	JP 1790562 C	29-09-1993
		JP 4073069 B	19-11-1992
		JP 63254367 A	21-10-1988
DE 3323898 A	03-01-1985	DE 3323898 A1	03-01-1985
US 2684787 A	27-07-1954	NONE	
US 6089477 A	18-07-2000	NONE	
US 4215803 A	05-08-1980	NONE	
US 6098849 A	08-08-2000	AU 694156 B2	16-07-1998
		AU 1268695 A	03-07-1995
		WO 9516634 A1	22-06-1995
		EP 0731772 A1	18-09-1996
US 4629098 A	16-12-1986	NONE	
US 6056949 A	02-05-2000	WO 9716078 A1	09-05-1997
		DE 59609238 D1	27-06-2002
		EP 0859554 A1	26-08-1998
		JP 2000513204 T	10-10-2000